Wastewater Treatment Division

Appendix C:
IT Standards

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Westin Engineering, Inc. Project 6251

Tables

1. IT STANDARDS

1.1. Introduction

The results of the Computer Systems Planning Study are documented in this Computer Systems Master Plan, which consists of:

- Executive Summary
- Master Plan
- Appendix A – Cost Avoidance Benefits
- Appendix B – IT Staffing
- ***Appendix C – IT Standards***
- Appendix D – IT Architecture
- Appendix E – Existing Condition Assessment
- Appendix F – Projects and Subprojects

This is Appendix C – IT Standards. The purpose of this Appendix is to provide an initial set of Information Technology (IT) standards. This will enable the Division to quickly move ahead with existing IT projects and formulate more effective plans for future IT projects. In addition to the specific technical standards, this appendix also frames two other sets of related standards:

1. IT governance policies – the standard policies by which the WTD intends to direct the design, selection, implementation, and maintenance of information systems
2. Software Project Management Standards – the industry standards by which the WTD intends to manage software projects.

These IT standards – the specific technical standards themselves, as well as the IT governance policies and the Software Project Management Standards – need to be read and utilized by WTD staff who are assigned to manage or direct IT projects within the Wastewater Program.

IT standards are critical to the successful implementation of the Master Plan recommendations and the proposed WTD IT Architecture. As discussed in the Master Plan, the new WTD IT Architecture will dramatically improve data access and information sharing. A conceptual design of this IT Architecture is in Appendix D of this document. As the Master Plan recommendations are implemented, this IT Architecture will be developed. As each of these projects start, IT standards will need to be in place to guide the selection of the technical elements that will be used to create the overall IT Architecture.

IT standards should be reviewed yearly to ensure that they are relevant, still meet the fundamental business needs of the Division and are consistent with County-wide IT standards. The initial set of IT standards listed below fulfill all of these objectives.

1.2. Application Integration Standards

To successfully construct the Information Technology Architecture recommended in the Master Plan, the Division will need to establish and apply application integration standards. The inability of the existing computer systems to share data is a result of not having IT standards. And if the past is an indication of the future, WTD must develop and implement IT standards to create an IT Architecture that will allow easy, fast and reliably access to accurate and relevant data.
Originally, integration was focused on connecting different kinds of hardware in support of a software application was that constructed from scratch. As hardware advances allowed increasingly complex software applications to be constructed, the nature of integration changed. Integration grew to mean the combining of hardware and software to form a system. Now the concept of integration is dominated by software.

The emergence of networking has facilitated the move from hardware integration to software integration. Consequently, organizations are increasingly focused on integrating existing and new software applications to improve the overall computing support for end-users. This has created a situation where software resides across the network on different hardware platforms, which in-turns increases the importance of having IT standards.

With the change in the nature of integration has come an increase in both the range and complexity of integration options. These options include:

- Sharing data between applications while ensuring quality and consistency (often referred to as the data integration model or approach);
- Providing integrated front-end access to applications (the presentation, or user interface, integration model);
- Bridging applications through workflow (the functional integration model); and
- Building new applications that pull together information from existing applications in an innovative manner (uses all of the integration models configured to address the specific needs of an organization).

Currently, WTD is largely incapable of sharing key business and operational information across the Division because it suffers from having “stovepipe” information systems. Stovepipe systems are systems that are incapable of sharing data with other systems or systems that are performing a specific function without regard to the data access needs of the Division. Not only do these stovepipe systems reduce staff productivity and responsiveness; they also reduce the quality of WTD decisions. By providing reliable access to quality relevant data across the Division, WTD management and staff will be able to make more informed decisions, quicker.

Simply replacing systems or installing the next version of existing software will not allow the Division to achieve the level of information sharing that is required. Smarter integration methods and tools are required. The WTD needs more flexibility to overcome the limitations of its stovepipe systems. The kind of flexibility required can only be achieved through an overall integration strategy that utilizes every single one of the integration options listed above: user interface integration, data integration, and workflow automation integration.

It has taken a couple of decades of hard experience for major corporations and now major governmental agencies to realize that replacing entire large-scale stovepipe systems is not an

effective enterprise solution. Even the new systems must be integrated to achieve the goals of efficiently accessing and sharing information. With the advent of middleware technologies – such as gateway, adapter, connector, and inter-application messaging technologies – it has quickly become apparent that the stovepipe systems can be connected with new components to achieve the necessary level of information sharing. The WTD IT Architecture proposed in the Master Plan incorporates the flexibility and effectiveness that these new technologies bring to integration. The IT standards listed below should be implemented if the Division is to make the Master Plan recommendations a reality.

1.3. Standard IT Governance Policies

To jump-start the Division's efforts to set in place the policies to guide the future implementation of computer and networking systems, the following policies are offered as guidelines. As the Division begins to implement the program elements, these policies need to be further developed.

Table C-1: IT Governance Policies

User Interface Policies	➢ We employ a standard Division user interface for applications. ➢ User interfaces are all web-based. ➢ User interfaces share a common look and feel. ➢ User interfaces provide a standard set of tools for accessing data, reports, and documents.
Application Policies	➢ It is preferable to buy rather than to build. ➢ All production applications – such as those for Plant and Offsite Control and Business Management – must have a disaster recovery plan. ➢ All systems must take into account appropriate security issues. ➢ Applications are designed to execute in a more global, Division-wide, environment. ➢ Applications are deployed in a layered architecture structure (i.e., separation of data, data management, application processing of data, user interface, and collaboration management). ➢ Applications are implemented so as to balance efficiency and maintainability. (This is typically achieved by selecting applications that address requirements for both day-to-day productivity as well as for long-term maintenance.) ➢ Whenever possible, applications start small and grow (i.e., extended and expanded in steps). ➢ Applications share a common application look and feel. (That is, applications will not only employ a common user interface but will process data in a similar manner.) ➢ All applications are deployed via a web-browser, enabling the application to run on any computer platform. ➢ We promote functional integration across applications, by selecting applications with workflow integration capabilities. ➢ Application implementations and configurations are driven from business requirements. ➢ All new applications adhere to the Division's IT Architecture. ➢ Application design must include a clearly delineated approach to

Table C-1: IT Governance Policies	
	testing the design to confirm that it meets user requirements. ➢ Human factors are considered in all application implementations. ➢ Applications are maintained under version control, with applications no more than 2 versions behind the latest release. ➢ Applications designs are modular, so that improved modules can be inserted into the solution without having to re-implement all the other aspects of the solution. ➢ Applications permit electronic connectivity for eBusiness, eCommerce, and eGovernment initiatives.
Data Policies	➢ Data is captured at its source once, then electronically distributed. ➢ Data is a Division-wide resource. ➢ We promote having one system identified as the "system of record" for any specific data or data class, thereby helping to reduce or eliminate data redundancy and increase data quality. ➢ We promote data stewardship. ➢ A Division-wide, wastewater-industry standard, data model drives our application architecture. ➢ Data is separated from applications. ➢ Data redundancy is actively managed in order to reduce it or eliminate it. ➢ Data must be timely, accessible, relevant, accurate, and understandable. ➢ Data access is transparent to users.
Infrastructure Policies	➢ IT and Wastewater Industry standards are preferable to internal standards. ➢ The vendor is as important as the product. ➢ We employ re-usable technical components. ➢ Computing infrastructure must include the means to manage all of its technical components. ➢ Technologies must enable platform scalability (i.e., the ability to scale from one to many users without significant re-design). ➢ Technologies must enable platform portability (i.e., the ability to operate on Microsoft-based PCs or Macintoshes without having to be significantly re-designed). ➢ We leverage existing assets. ➢ We are not the earliest adopter of new technology; nor are we a late adopter of new technology. ➢ The domain of our infrastructure and applications is Division-wide.

1.4. Specific Technical Standards

The recommended technology standards for the Division are presented in Table C-2: IT Technical Standards for each of the major technical elements of modern information and control systems:

Table C-2: IT Technical Standards

Technical Component	Recommended Vendor/Product
Standard Desktop Operating System Software	Today: Microsoft Windows 2000; Macintosh (but no new licenses) Late-2002: Microsoft Windows XP; Macintosh (but no new licenses)
Desktop Web Browser	Microsoft Internet Explorer
Standard Desktop Productivity Software	Today: Microsoft Office 2000 Late-2002: Microsoft Office XP
Standard Desktop Email	Microsoft Outlook
Standard Server Operating System Software	Today: Microsoft Windows 2000 Late-2002: Microsoft Windows XP
Server Hardware for file/print and Internet/email access	Today: Dell Poweredge 2550 or similar high-availability server configuration: Pentium III Processor at 1.26GHz; 256KB Cache; Minimum 1GB SDRAM; Minimum 18GB Hot-Swap Hard Drives; Up to 356GB Internal Storage Capacity Mid-2005: Replacement with a configuration projected to be: 8-way Pentium IV Processors at 25GHz; 1GB Cache; Minimum 10GB SDRAM; Minimum 250GB Hot-Swap Hard Drives; Up to 2TB Internal Storage Capacity
Server Software for email/print and Internet/email access	Microsoft Backoffice, including Microsoft Exchange, Microsoft Internet Server
Application Server Hardware for Section Class Applications	Today: Dell Poweredge 6450 or similar medium transaction-processing configuration: Pentium III Xeon Processor at 700MHz (Quad-Processor Capable); 1MB Cache; Minimum 1GB SDRAM; Minimum 18GB Hot-Swap Hard Drives; Up to 292GB Internal Storage Capacity Mid-2005: Replacement with a configuration projected to be: 8-way Pentium IV Processors at 25GHz; 8GB Cache; Minimum 100GB SDRAM; Minimum 250GB Hot-Swap Hard Drives; Up to 2TB Internal Storage Capacity
Application Server – Division-Wide Applications (Applications of this caliber also require a Database Server)	Today: Dell Poweredge 6450 or similar high-availability, high-transaction processing configuration: Pentium III Xeon Processor at 900MHz (Quad-Processor Capable); 2MB Cache; Minimum 8GB SDRAM; Minimum 18GB Hot-Swap Hard Drives at 15,000 RPM; Up to 292GB Internal Storage Capacity; 4 Hard-Drive Bays Mid-2005: Replacement with a configuration projected to be: 8-way Pentium IV Processors at 25GHz; 16GB Cache; Minimum 100GB SDRAM; Minimum 250GB Hot-Swap Hard Drives at 45,000 RPM; Up to 2TB Internal Storage Capacity

Table C-2: IT Technical Standards

Technical Component	Recommended Vendor/Product
Database Server (For Data Warehousing and Integration Bus components; also used to support Division-Wide Applications in conjunction with an Application Server)	Today: Dell Poweredge 6450 or similar high-availability, high-transaction processing configuration: Pentium III Xeon Processor at 900MHz (Quad-Processor Capable); 2MB Cache; Minimum 8GB SDRAM; Minimum 18GB Hot-Swap Hard Drives at 15,000 RPM; Up to 292GB Internal Storage Capacity; 4 Hard-Drive Bays Mid-2005: Replacement with a configuration projected to be: 8-way Pentium IV Processors at 25GHz; 16GB Cache; Minimum 100GB SDRAM; Minimum 250GB Hot-Swap Hard Drives at 45,000 RPM; Up to 2TB Internal Storage Capacity
Application Programming (For development of point-to-point application interfaces)	Today: Microsoft Visual Basic 2000 Mid-2002: Microsoft Visual Studio.NET
Storage Vault (For Data/Map/Scanned Document Repositories and Integration Bus components)	Today: Dell Powervault 755N or similar configuration: Up to 7.2TB storage Mid-2005: Replacement with a configuration projected to be: Storage Vault with up to 100TB storage
Relational Database Management System Software – Workgroup Class	Today: Microsoft Access 2000 or Microsoft SQL Server 2000 Mid-2003: Microsoft SQL Server 2002
Relational Database Management System Software – Section Class	Today: Microsoft SQL Server 2000 Mid-2003: Microsoft SQL Server 2002
Relational Database Management Software – Division-Wide Class	Today: Oracle 7.x Mid-2003: Oracle 8.x or higher; re-look at Microsoft SQL Server 2002 at that time
Network Switches – Server Connectivity Class	Today: Dell Powerconnect 5012 or similar configuration: 24GB throughput; supporting TCP/IP standards
Information Portal	Today: Tibco Active Portal or similar enterprise-class portal employing XML integration standards, and able to display both static HTML and dynamic web pages Mid-2004: Upgrade to new version
Integration Bus	Today: Tibco Active Enterprise or similar enterprise-class integration software employing XML integration standards Mid-2004: Upgrade to new version

1.5. Software Project Management Standards

The following work should be accomplished for all software implementation projects. To skip any of these tasks, or to short cut any of these tasks, is not good practice. These tasks are consistent with IEEE standards and are utilized by all professional Information Technology firms when implementing software applications. There are some unique features to any specific type of application – such as SCADA or a web-based portal – but, in general, all software implementation projects follow these identical tasks:

- Project Management – management of all project tasks; management of vendors and subcontractors
- Project Initiation – establish project team, objectives and mission statement; conduct workflow and data analysis of existing systems in order to determine the functionality that needs to be retained and what needs to be improved or replaced; formulation of desired workflows and data architecture to meet future needs; establishment of data structures and naming conventions
- Requirements – detailed requirements definition (including determination of what data is required, who uses the data, how the data is used, why the data is needed, and benefits to the Division); user involvement in the definition of software requirements; pre-design or specification of solution or solution components
- Analysis & Design – final design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing; confirmation by users that requirements fulfilled
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Condition Assessments (also referred to as Environmental Audits in IEEE industry standards documents) – review of factors external to the project that might impact the achievement of the project objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this project, and changes in business or operations objectives.
- Regular updates with clients, stakeholders, end users, software and hardware application managers and technical maintenance staff should be completed during every project phase. The intent is to keep management and staff apprised of the project status and to ensure the project will meet the need of the Division.